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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/501,723

07/15/2004

Ulrich Bast

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4374

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08/30/2006

Siemens Corporation
Intellectual Property Department
170 Wood Avenue South
Iselin, NJ 08830

EXAMINER

HANAN, DEVIN J

ART UNIT

PAPER NUMBER

3745

DATE MAILED: 08/30/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/501,723	Applicant(s) BAST ET AL.	
	Examiner Devin Hanan	Art Unit 3745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 June 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 12-16, 18-21 and 23-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 12-16, 18-21 and 23-30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 July 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

Applicant's arguments filed 6/15/2006 have been fully considered but they are not persuasive. The applicant argues the 50 cm length turbine blade made out of a plurality of materials, with 40 percent by volume of the materials having at most a density of 4g/cm cubed is different from the prior art. The examiner argues that the same structure can be taught by a combination of references; therefore, a turbine blade with the same structure as the applicant can be made to the same length as specified by the applicant.

Examiner has also cited the Department of Defense Composite Materials Handbook Volume 5 Ceramic Matrix Composites to show that materials used by Morrison et al. have a density of less than 4g/cm cubed and can contain carbon (page 227 and 63, respectively).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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Claims 12-16, 18-21 and 23-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oguma et al. (U.S. Patent 6,756,131) in view of Morrison (U.S. Patent 6,514,046).

Oguma et al. disclose a gas turbine blade with a metallic root portion (figure 4, 41);

a platform portion (42); and

an airfoil (43).

Oguma et al. do not disclose that the root, platform and airfoil are collectively comprised of a plurality of materials in which at least 40% by volume of the materials have a density of at most 4g/cm cubed, wherein the density by volume provided by the plurality of materials allow providing a length of at least 50 cm for a blade disposed in the fourth stage and onward of the multistage turbine.

However, Morrison et al. teach of an airfoil made of a plurality of materials in which at least 40% by volume of the materials have a density of at most 4g/cm cubed (Morrison et al. discloses the inner layer of ceramic material can be made from AS-N720, which the Department of Defense Composite Materials Handbook lists as having a density of 2.54 g/cm cubed, which is less than 4 g/cm cubed, page 227) and **are capable of** providing a length of at least 50 cm for a blade disposed in the fourth stage and onward of the multistage turbine (the modified apparatus has the same structure of the applicants' apparatus so therefor it can be of a length of at least 50 cm) for the purpose of having a ceramic shell to "bear substantially all of the thermal stress" and a

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metallic core to bear “almost all mechanical loading including aerodynamic loading, during operation” while reducing weight (abstract).

Since Oguma et al. and Morrison et al. are both metal/ceramic turbine blades, the purpose disclosed by Morrison et al. would have been recognized in the pertinent prior art of Oguma et al. At the time invention was made, it would have been obvious to one having ordinary skill in the art to modify the metal core with a ceramic coated blade design of Oguma et al. by using the materials as disclosed by Morrison et al. for the purpose of creating an airfoil a ceramic shell to “bear substantially all of the thermal stress” and a metallic core to bear “almost all mechanical loading including aerodynamic loading, during operation” while reducing weight (abstract).

Regarding claim 13, the modified apparatus of Oguma et al. discloses all of the claimed limitations as discussed in claim 12 above and the rotor disk is metallic (figure 6 shows blade 4 on a rotor disc, rotor disks are inherently metal).

Regarding claim 14, the modified apparatus of Oguma et al. discloses all of the claimed limitations as discussed in claim 12 above, but disclose the metallic core is surrounded by a structural ceramic material.

However, Morrison et al. teach of a metallic core surrounded by a structural ceramic material that is strain tolerant (the inner layer 46 is structural, col. 4 line 24) to bear the part of the mechanical load that the metallic core does not (metallic core does not bear all the mechanical loading so the strain tolerant ceramic layer must bear some load, col. 4 lines 4-6) and the ceramic material will bear the thermal load (abstract).

Since Oguma et al., as modified, and Morrison et al. are both partially ceramic turbine blades, the purpose disclosed by Morrison et al. would have been recognized in the pertinent prior art of Oguma et al. At the time invention was made, it would have been obvious to one having ordinary skill in the art to make use the structural ceramic of Morrison et al. in the blade of Oguma et al. for the purpose of bearing some of the thermal load and the mechanical load (abstract and col. 4, line 24).

Regarding claim 15, the modified apparatus of Oguma et al. discloses all of the claimed limitations as discussed in claim 14 above, and disclose the metallic core is formed at least in part from a metallic foam to allow cooling fluid to pass through to contact the ceramic shell (col. 4 lines 61-63).

Regarding claim 16, the modified apparatus of Oguma et al. discloses all of the claimed limitations as discussed in claim 12 above, but does not disclose a non structural ceramic protective layer arranged over the ceramic material.

However, Morrison et al. teach of a non-structural protective ceramic layer over the ceramic material to serve as the high temperature insulating ceramic (col. 4 lines 30-33).

Since Oguma et al., as modified, and Morrison et al. are both partially ceramic turbine blades, the purpose disclosed by Morrison et al. would have been recognized in the pertinent prior art of Oguma et al. At the time invention was made, it would have been obvious to one having ordinary skill in the art to add the non-structural protective ceramic layer of Morrison et al. to the blade of Oguma et al. for the purpose of serving as the high temperature insulating ceramic (col. 4 lines 30-33).

Regarding claim 18, the modified apparatus of Oguma et al. discloses the same structure as the applicant, so it is therefore capable of being made in a 65 cm length, like the applicant.

Regarding claim 19, the modified apparatus of Oguma et al. discloses the turbine blade has a metallic skeleton material that functions as a structural frame and is adapted to support a structural ceramic material, as discussed in claims 14 and 15 above (metal layer 30 supports the inner layer of ceramic material 46).

Regarding claim 20, the modified apparatus of Oguma et al. discloses the materials are a ceramic material, as discussed in claims 14 and 16 above (inner layer 46 and outer layer 44 are both ceramic).

Regarding claim 21, the modified apparatus of Oguma et al. discloses the material with the density of at most 4g/cm cubed is carbon containing (Morrison et al. discloses the inner layer of ceramic material can be made from AS-N720, which the Department of Defense Composite Materials Handbook lists as being reinforced with carbon fibers, page 63).

Regarding claim 23, the modified apparatus of Oguma et al. discloses all of the claimed limitations as discussed in claim 12 above and disclose the first section adjacent the root has a first density and a second section (the tip portion) adjacent the first section having a second density which is different (The two portions would have different densities due to the tip portion having additional ceramic material on the radially outer tip).

Regarding claim 24, the modified apparatus of Oguma et al. discloses all of the claimed limitations as discussed in claim 12 above.

Regarding claim 25, the modified apparatus of Oguma et al. discloses all of the claimed limitations as discussed in claims 14 above (metal layer 30).

Regarding claim 26, the modified apparatus of Oguma et al. discloses all of the claimed limitations as discussed in claim 20 above.

Regarding claim 27, the modified apparatus of Oguma et al. discloses all of the claimed limitations as discussed in claim 21 above.

Regarding claim 28, the modified apparatus of Oguma et al. discloses all of the claimed limitations as discussed in claim 19 above.

Regarding claim 29, the modified apparatus of Oguma et al. discloses all of the claimed limitations as discussed in claim 15 above

Regarding claim 30, the modified apparatus of Oguma et al. discloses all of the claimed limitations as discussed in claim 16 above.

Prior Art

The Department of Defense Composite Materials Handbook Volume 5 Ceramic Matrix Composites shows the material AS-N720 to have a density of less than 4 g/cm cubed.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Devin Hanan whose telephone number is 571-272-6089. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Look can be reached on 571-272-4820. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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8/28/06